

## SERIAL COMMUNICATION OVER COMMUNICATION CONTROL PIN

### FIELD

**[0001]** The subject matter described herein relates to connectors including devices used with for example the Universal Serial Bus (USB).

### BACKGROUND

**[0002]** Physical connectors, such as the connector used with the Universal Serial Bus (USB), can be used to couple devices. USB standards define physical and electrical aspects of USB. Examples of those standards include Universal Serial Bus 3.1 Specification, Universal Serial Bus 3.0 Specification, and any additions, revisions, and updates thereto.

### SUMMARY

**[0003]** Methods and apparatus, including computer program products, are provided for serial communications over a communications control pin.

**[0004]** In some example embodiments, there may be provided a method. The method may include detecting, by a first device including a data interface, a current flow at a first communication control pin at the data interface; and assigning, by the first device based on the detection of the current flow at the first communication control pin, serial data communication circuitry to a second communication control pin at the data interface to carry serial data communications to another device.

**[0005]** In some variations, one or more of the features disclosed herein including the following features can optionally be included in any feasible combination. The data interface may include at least one of a universal serial bus connector and a universal serial bus receptacle. The first communication control pin and the second communication control pin may be coupled to at least pull-down resistor and a ground. The first communication control pin may be coupled to the other device including a pull-up resistor causing the current flow when coupled. The first communication control pin may be located at a first row of the data interface, and wherein the second communication control pin may be located at a second row of the data interface. The detecting may further include identifying the first communication control pin as actively carrying communication control signaling. The assigning may further include selecting the second communication control pin that is not actively carrying communication control signaling to carry the serial data. The first device may detect a current flow at the second communication control pin and assigning, based on the detection of the current flow at the second communication control pin, the serial data communication circuitry to the first communication control pin to carry serial data communications to the other device.

**[0006]** Moreover, there may be provided, in some example embodiments, a method. The method may include detecting, by a device including a data interface having a first communication control pin and a second communication control pin, a current flow at the first communication control pin, the current flow caused by at least a pull-up resistor; and communicating, by the device when the current flow is detected at the first communications pin, serial data via the second communication control pin at the data interface.

**[0007]** In some variations, one or more of the features disclosed herein including the following features can optionally

be included in any feasible combination. The data interface may include at least one of a universal serial bus connector and a universal serial bus receptacle. The first communication control pin may be coupled to the other device including a pull-down resistor causing the current flow when coupled. The first communication control pin may be located at a first row of the data interface, and the second communication control pin may be located at a second row of the data interface.

**[0008]** The above-noted aspects and features may be implemented in systems, apparatus, methods, and/or articles depending on the desired configuration. The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims.

### DESCRIPTION OF THE DRAWINGS

**[0009]** In the drawings,

**[0010]** FIG. 1 depicts an example of a data connector;

**[0011]** FIG. 2 depicts an example of a system **200** configured to use a communication control pin of a data connector for serial communications, in accordance with some exemplary embodiments;

**[0012]** FIG. 3 depicts an example of a system **300** including a charger and a host configured to use a communication control pin of a data connector for serial communications, in accordance with some exemplary embodiments;

**[0013]** FIG. 4 depicts an example of a process **400** for detecting an active communication control pin and assigning another communication control pin to carry serial data communications, in accordance with some example embodiments; and

**[0014]** FIG. 5 depicts an example of an apparatus, in accordance with some example embodiments.

**[0015]** Like labels are used to refer to same or similar items in the drawings.

### DETAILED DESCRIPTION

**[0016]** An example of a data connector is depicted in FIG. 1. The connector may comprise a single, small-sized data connector that can be swapped, so that an end-user does not need to be concerned with the whether the connectors is connected to a host or a slave device or in which way the plug is inserted to the receptacle. The connector may be configured as a universal serial bus (USB) connector, so that either of for example the two USB 3.0 buses can be used to couple to a host device or a slave device. Moreover, the connector can be rotated or twisted. This differs from prior USB connectors having physically different host connectors and slave connectors. The detection of a host or a slave may be performed using Communication Control (CC) signals carried by CC pins or lines. These CC signals may also be used to detect the orientation or direction of the USB connector. The connector (for example, male plugs) may have two CC pins **102** and **104**, one in the upper row of the connector **100** and one in the lower row of the connector **100** as shown in FIG. 1. Although both CC pins **102** and **104** can be present, in standard cables only a single CC pin at connector **100** may be connected and wired through the cable and coupled to another device. In accessories with captive cables or directly attached accessories, only one CC-pin may be used for normal CC-detection.